that such work done would pay back to the State many-fold its cost. A scientific survey has long been needed for Kansas, and here is another reason why it should not be delayed.

KANSAS WEATHER SERVICE.

By Prof. J. T. Lovewell, Washburn College, Topeka.

Meteorology has been raised to the dignity of a science by virtue of combined systems of observation over vast areas, corresponding in some degree with the magnitude of the phenomena they undertake to interpret. It has come to be recognized that the problems of meteorology are vast enough to tax the energies and resources of nations; hence, in modern times the foremost governments of the earth have established weather bureaus, and provided a regular system for collecting the facts and arranging them in such a form that scientific deductions and discussions become possible.

Owing to geographical and topographical conditions, as well as to the enterprise of our meteorologists, it has been reserved for the United States to develop the most complete and accurate system of weather observation the world has yet seen. The system, however, is in its infancy, and splendid as have been the achievements of Reed, Maury, Meyer and others, much yet remains to be done to bring it to full development.

There are always to be found in every community willing observers of the weather. It is a subject which concerns everybody; it is the grand piece de resistance on which we fall back when other topics of conversation fail. It affords endless opportunities for guessing and infinite variety in treatment. It is by no means certain that scientific knowledge will in any wise improve the weather as a social theme, for by the methods of science we have nothing to conjecture which can be ascertained by actual observation, and the wise man will remain discreetly silent where knowledge fails. We can, however, afford to sacrifice the poetry of weather and its myths for the sake of truth, and there is a way of utilizing the universal interest in the subject so as to obtain a multitude of willing observers of weather phenomena, each of whom will help in establishing the basis of fact out of which all valuable theories grow and on which they rest.

This organization of volunteer work has been most successfully shown to be possible, by the labors of Hinrichs in Iowa and Nipher in Missouri, while the New York Herald Weather Department has shown what a great metropolitan newspaper can accomplish.

Here in Kansas, we have quite a number of points where meteorological notes have been accurately and systematically kept for quite a number of years. Foremost among these are Professor Snow's valuable observations at the State University, and the Signal Service observations at Leavenworth and Fort Dodge. There are many other points in the State where observa-

tions are taken occasionally, with commendable accuracy, but their value is lost from lack of continuity and system. Most observers grow tired of the monotonous record of daily weather changes, and do not perceive the value and interest of such records when long continued and systematically arranged. Even then it requires the comparison and compilation of many such records, taken at points suitably distributed throughout the State, to be able to understand their real significance and importance.

Last winter, it was resolved by the Topeka Scientific Club to try to systematize and utilize volunteer weather observations heretofore taken in Kansas, and at the same time to establish observations in every county of the State. For this purpose they organized the Kansas Weather Service. It was thought best, if possible, to enlist the combined talent of the State in the enterprise, and secure at least the sympathy, if not the active coöperation, of the U. S. Signal Service. Correspondence was accordingly entered into with the authorities at Washington, which resulted in the loan of necessary instruments for the central station. This was located at Washburn college, and the President and other officers of this institution have given very material assistance in carrying out these plans. A commodious observatory has been secured in the college building, and the college laboratory and cabinets supplement the instrumental appliances.

The writer undertook to act as director of this weather service, and with aid of Mr. Chase and Mr. Hilton, of the Topeka Scientific Club, observers were engaged in different parts of the State, instructions and blanks were issued, and arrangements made for supplying thermometers and rain-gauges.

This preliminary work was completed last July, and since then a careful record has been kept at the central station, and reports published. About twenty-five other stations are now established and from some of these the reports have been sent in with considerable regularity and accuracy. There is evidence that much patience and labor are requisite to secure observations at desirable points that will be satisfactory. There exists, however, much reason for encouragement, and the work will be steadily pushed as fast as the resources at our command will allow. It must be remembered that all the labor is done without remuneration, and in time snatched from the intervals of other occupations. This is true of the director as well as all the observers, and not only must time be given freely, but expenses for printing, paper and postage must be provided. These have thus far been met by the liberality of the Scientific Club and by Washburn College. The ends to be gained are worthy all the effort, since we shall secure data for a more accurate study of the ordinary weather phenomena than has hitherto been possible. We shall also have a trained body of observers to note the facts in any occasional phenomena, like tornadoes, earthquakes, remarkable temperatures and rainfalls. There will be valuable notes on the phenomena relating to vegetation, rainfall and temperature, which cannot fail to be more accurate than any yet published, and they will be useful in determining the exact resources and advantages of different parts of the State. The question whether our rainfall increases with the cultivation of the soil, interesting alike in its scientific and economic aspects, can only be settled by such observations as we propose to publish.

Finally, when these reports are taken in connection with similar reports

of the two great contiguous States of Missouri and Iowa, their combined value will be greatly enhanced for purely scientific purposes. We shall have a larger consecutive area of the earth's surface under minute and systematic observation than exists elsewhere to my knowledge. We can trace storms in their track over a level country, from western Kansas to the Mississippi river, many hundred miles in any direction, and can thus determine their laws and the ways of avoiding them, if this be possible. At the next annual meeting of the Academy it is hoped that the organization of the Kansas Weather Service will be so far perfected that no question will exist as to its permanence. It is not, of course, expected that the fruits of its work will be gathered or apparent the first or the second year. It may be changed in many details when experience shows such changes profitable, and ultimately should be considered a permanent feature of the Agricultural Department of the State, and be under State management. The objct of bringing it at this time before the Academy, is to present its claim to scientific interest, and to secure sympathy and coöperation in a work which, if done at all, must be the labor of many hands.

METEOROLOGICAL SUMMARY.

Prof. F. H. Snow's Annual Reports as Meteorologist to the State Board of Agriculture.

Station: Lawrence, Kas. Latitude 38° 57′ 25″; longitude, 95° 15′; elevation of barometer and thermometers, 875 feet above the sea level, and 5 feet above the ground; rain-guage on the ground; anemometer, 105 feet above the ground, on the dome of the University building, 1,200 feet above the sea level.

SUMMARY FOR 1878.

The chief characteristics of the weather of 1878 were the large and well-distributed rainfall, the high average temperature, the absence of great extremes of temperature, the long period of immunity from severe frosts, the comparative lightness of the winds, and low temperature and great snowfall of the month of December.

TEMPERATURE.

Mean temperature of the year, 55.33°, which is 2.37° above the mean of the ten preceding years. The highest temperature was 98°, on the 15th of July and 24th of August; the lowest was 6° below zero, on the 18th and 25th of December, giving a yearly range of 104°. Mean temperature at 7 a. m., 49.46°; at 2 p. m., 64.32°; at 9 p. m., 55.31°.

Mean temperature of the winter months, 32.41°, which is 2.79° above the average winter temperature; of the spring, 57.37°, which is 4.58° above the average; of the summer, 75.13°, which is 1.2° below the average; of the autumn, 56.13°, which is 3.87° above the average.